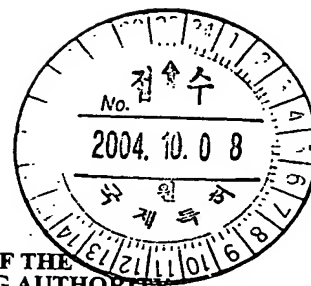


PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY



PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

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Date of mailing
(day/month/year) **01 OCTOBER 2004 (01.10.2004)**

Applicant's or agent's file reference
3fpo-06-01

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/KR2004/000309

International filing date (day/month/year)

16 FEBRUARY 2004 (16.02.2004)

Priority date (day/month/year)

16 DECEMBER 2003 (16.12.2003)

International Patent Classification (IPC) or both national classification and IPC

IPC7 C12M 1/00, C12M 1/14

Applicant

LEE, Choul-Gyun et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR



Korean Intellectual Property Office
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Authorized officer

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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

international application No.

PCT/KR2004/000309

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/KR2004/000309

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-19	YES
	Claims	None	NO
Inventive step (IS)	Claims	1-19	YES
	Claims	None	NO
Industrial applicability (IA)	Claims	1-19	YES
	Claims	None	NO

2. Citations and explanations :

1) The following documents cited in the search report have been taken into consideration in this report:

D1 = WO 00-12673 A

D2 = US 4952511 A

D3 = WO 91-07080 A1

D4 = JP 10-108665 A

D5 = KR 2003-12650 A1

2) D1 discloses the photobioreactor comprising an upstanding core structure; a plurality of substantially transparent tubes supportable by the core structure; flow means for causing a synthesis mixture to flow through each of the transparent tubes; and withdrawal means for withdrawing a biomass synthesis product from the mixture.

D2 discloses the photobioreactor for the cultivation of photosynthetic microorganisms comprises a tank, one or more light compartments extending into the tank and one or more high intensity lamps whose light is directed into the light compartments.

D3 discloses the photobioreactor for the cultivation of photosynthetic microorganisms is disclosed wherein a plurality of baffles are mounted in the photobioreactor tank forming hollow cavities which enable the insertion of light sources through openings in the tank wall.

D4 discloses the photobioreactor which is provided with a light diffusion element having a narrow light-receiving face, a wide light-emitting face and a light-diffusing face.

D5 discloses the anti-fouling photobioreactor is characterized by comprising a chamber with a transparent inner tube and a flow generating unit to allow culture broth to flow through the inner tube.

3) Novelty and inventive step - PCT Article 33(2)-(3):

D1, which is considered to represent the most relevant state of the art, discloses the photobioreactor from which the subject matter of claim 1 differs the photobioreactor with the inside thereof divided into the two region.

None of the cited prior art suggests the bioreactor according to Claim 1 and Claim 2 which divided into a vegetative growth region and a useful-metabolite production region.

(Continued on Supplemental Box)

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

BOX V.

An inventive step can be acknowledged since the photobioreactor according to Claim 1 to 2 and the method of Claim 13 to 14 using the same allow the conventional two-stage culture process to be performed in a single reactor.

As a consequence, the subject-matter of Claim 1 to 2 and Claim 13 to 14 and its dependent Claim 3 to 12 and 15 to 19 is novel and inventive over the cited prior art. Therefore, the subject-matter of Claims 1 to 19 would appear to meet the requirements of Article 33(2) and 33(3) PCT.

4) It would appear that the claimed subject-matter is industrially applicable.

Therefore, the subject-matter of Claims 1 to 19 meets the requirements of Article 33(4) PCT.